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# HOW TO Identify BUTTERNUT CANKER

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North Central Forest Experiment Station  
Forest Service, U.S. Department of Agriculture



## How To Identify BUTTERNUT CANKER

Butternut, also called white walnut, is closely related to black walnut. Butternut wood is much lighter in color, but it can be stained to look like walnut. It has many uses including furniture, cabinets, fine woodwork, and paneling. In fact, quality butternut wood is often second only to walnut in economic value.

### How to tell Butternut from Black Walnut

Butternut and black walnut are closely related and, to an unexperienced person, they are sometimes difficult to tell apart. Here are some distinguishing characteristics.

	Butternut	Black Walnut
Fruit	Ellipsoidal	Spherical
Bark	Gray, on old trunks divided by dark fissures into lighter, flat-topped ridges.	Dark brown with deep furrows on older trunks
Twigs	Chambered, dark brown pith. Leaf scars with hairy fringe across the upper margin that look like eyebrows.	Chambered, light brown pith. Leaf scars without a hairy fringe across the upper margin.

Butternut occurs sparsely on rich moist sites throughout the northern two-thirds of eastern United States. Nowhere is butternut common but it is becoming even scarcer, chiefly because of a recently discovered canker disease. Except for this canker, first reported in 1967 but probably present in this country much earlier, the tree seems to have no serious diseases. Presumably, if the canker could be controlled, butternut would become more abundant.

Butternut canker is present throughout much of the butternut range. Trees of all ages and sizes and on all sites are infected. Cankers spread around branches and trunks, eventually girdling the trees and, after several years, killing them. The canker is caused by a newly described fungus species *Sirococcus clavigignenti* — *juglandacearum* sp. nov. The dying portions of the tree often are rapidly colonized by a secondary invading fungus, *Melanconis juglandis*. The disease has been detected occasionally on black walnut saplings, primarily those under stress, but does not seem to pose a serious threat to this species.

### Identification

**Look for:** Dying branches or dead tops; epicormic shoots below killed portions (see cover photograph).

**Discolored bark**

In spring, an inky-black, thin fluid exuding from cracks in the cankers.



In summer, sooty bark patches, commonly with a whitish margin.

**Cankers**

Young sunken, elongate branch cankers originating at leaf scars, buds, and various wounds.



Older stem and branch cankers, many loosely covered by shredded bark, and bordered by successive callus layers.





Dark brown to black wood in an elliptical pattern beneath bark.



Single or coalescing cankers girdling branches (causing dieback) and stems (killing tree).

Branch suckers and trunk sprouts are readily infected and die rapidly.

### Fruiting Bodies and Spores

Under the outer bark, the causal fungus forms a thin, black stroma from which hyphal pegs arise, lifting the outermost bark layer. Among the pegs are small,



rounded fruiting bodies called pycnidia. Tan, sticky spore masses produced during rainy weather throughout the growing season are composed of hyaline, two-celled, fusiform spores called conidia. The spores have a median septation and range in size from 9 to 17 $\mu$  by 1.0 to 1.5 $\mu$ . Spores suspended in water swell slightly in width and decrease in length and look like two spear points butted together. Spores are disseminated by splashing or blowing rain and possibly by insects.



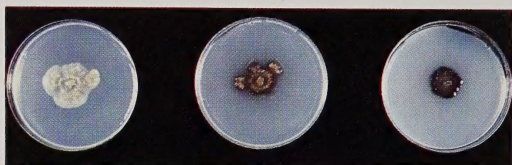
(Spores stained with trypan blue)



## Culturing Techniques

The fungus is readily isolated from both bark and wood on common agar. Best results are achieved by isolating from the margins of young twig cankers and older branch or trunk cankers. The fungus grows well at 16 to 28C in light or dark, forms hyphal pegs and pycnidia — the imperfect stage (perfect stage unknown) — and sporulates profusely in culture. To culture the fungus:

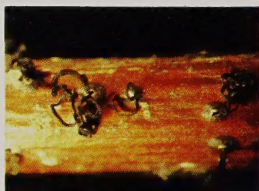
- Soak a 3- to 6-cm length of a twig canker or infected wood section at the canker margin in a 1:10 hypochlorite solution (household bleach and water) for about 1 minute to sterilize the surface.
- Remove the material from the solution and cut away the bark with a sterile knife, scalpel, or razor blade. From the margin of the canker, where infected and healthy tissues meet, cut out a 3-mm cube, including a portion of the uncantered wood.
- Place 4 or 5 dissected sections well spaced on top of an agar medium, such as malt or potato dextrose (PDA), in petri dishes and incubate at 20 to 25C. Spore masses will form within 2 weeks and can be used to confirm the identity of the causal organism. Spores are more easily examined microscopically if stained with trypan blue in lactophenol at magnifications between 150x and 430x. Cultures incubated in partial or full light often range from light to dark brown in color and may not fruit as well as cultures incubated in total darkness.



## Distinction Between *Melanconis juglandis* and Butternut Canker

*Melanconis juglandis* commonly colonizes tissues killed by the butternut canker fungus and, hence, can be mistaken as the primary killer of butternut. So it is important to know the difference between the two fungi.

The distinction is in the fruiting bodies and spores. The imperfect stage, *M. oblongum*, is more conspicuous





than the perfect stage and forms tiny, dark, smooth bumps on the bark which open to reveal the black fruiting bodies. Inky black masses of spores (conidia) are produced and, in saturated air, may ooze out in black tendrils. The spores are generally asymmetrically ovoid, dark, nonseptate, and average  $9\mu$  by  $19\mu$ .



## Control of Butternut Canker

There is no known control for butternut canker. Cultural controls such as avoiding logging injuries and preventing movement of infected logs into regions where the canker is not present might reduce the incidence and spread of the canker.

A few trees remain healthy, even in heavily infected stands, indicating that some butternut trees may be resistant. For example, the cross sections in the upper right photo show a canker-deformed tree (left) and a healthy tree (right). The photo below compares a tree that had over 50 trunk cankers (left) with a tree that had no cankers (right), even though they were growing side-by-side. (Both trees had their bark removed to find cankers.) If resistant trees can be found and propagated, they could be used to restock forests where butternut is being or has been eliminated by the fungus. Fungicide control does not appear practical except in nurseries and plantations.

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